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FEDERAL COMMUNICATIONS COMMISSION  
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July 23, 2001

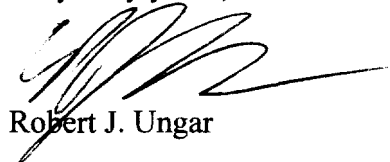
Ms. Magalie Roman Salas, Secretary  
Federal Communications Commission  
445 Twelfth Street, S.W.  
Washington, D.C. 20554

Dear Ms. Salas:

Enclosed on behalf of Powerwave, Inc. is a Petition for Rulemaking intended for disposition by the Office of Engineering and Technology.

Please call if you have any questions.

Very truly yours,



Robert J. Ungar

RJU/syd

Enclosure  
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**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Petition for Rulemaking	)	RM No.
to Establish Modular Authorization	)	
Regulations for Linear Amplifiers Used	)	
with Transmitters Licensed in Various	)	
Commercial Wireless Radio Services	)	

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**FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY**

**Petition for Rulemaking**

Powerwave Technologies, Inc. ("Powerwave") hereby files this Petition for Rulemaking or, in the alternative, for a [written] statement of policy, to establish a modular authorization program for linear amplifiers (LPAs) used in connection with base station transmitters in the Cellular, PCS, MDS and other commercial wireless radio services.

Powerwave is a leading supplier of radio frequency power amplifiers. Powerwave designs, manufactures and markets single and multi-carrier ultra-linear power amplifiers for a variety of frequency ranges and transmission protocols. The company's products are key components in wireless communications networks, including cellular and Personal Communications Services products, and for the Wireless Local Loop market. Powerwave has also developed RF power amplifiers for third generation transmission protocols.

The wireless communications infrastructure equipment industry is extremely competitive and is characterized by rapid technological change, new product development, rapid obsolescence and evolving industry standards. Powerwave invests significant resources in the research and development of methods to improve amplifier performance, including reduced noise and potential interference, and to increase power in the amplification process. The company also expends significant resources in the development of new power amplifier products to support new transmission protocols, including EDGE and third generation protocols such as W-CDMA and cdma2000.

Expenditures for research and development in the year 2000 exceeded \$41 million. Ultimately, the company's success hinges upon the ability to develop and get new products to market to keep pace with rapidly changing technology and evolving industry standards and communications protocols.

The Commission's policies and test procedures for linear amplifiers are based on its general authority to regulate "transmission and retransmission" equipment. Much of the Commission's approach has evolved as unwritten policy. While this type of regulation is flexible and shows the Commission's staff's willingness to adapt to changing technology, clearly the time has come to codify some of the Commission's policies for the certification of linear amplifiers.

For instance, as a product of various discussions with the staff of the FCC Laboratory in 1998 and 1999, it was agreed that as long as a linear amplifier was certified for use with a cellular radio or PCS certified transmitter, it could be used with any other such certified transmitter without obtaining additional certifications, either for the transmitter or amplifier. This policy has been an informal arrangement which, to date, the Commission has not announced in any public release. As such, the policy is understood by some manufacturers of linear amplifiers but not necessarily appreciated by the purchasers of linear amplifiers. This has resulted in confusion. Also, it must be recognized that any unwritten policy is always vulnerable to the varying interpretations of a changing Commission staff and so reliance on the policy is problematic.

The purpose of this Petition is to formalize the certification process for these amplifiers in order to achieve needed certainty in what has become a most dynamic marketplace. Certainty will benefit not only the manufacturers of amplifiers, but also the cellular and PCS licensees who will have the certainty of knowing what equipment changes will or will not require further Commission authorization.

In the past, as well as recently, the Commission has amended its certification policies to permit certain equipment once certified for use with representative devices, to be used with other such devices without again having to go through the rigors of

certification. When properly applied these policies have enabled manufacturers to respond to market conditions speedily without first having to pursue a costly and time consuming authorization process. The Commission has benefited as well by avoiding the administrative clutter that comes with thousands of requests for equipment authorization.

The Commission has employed this “modular” procedure for personal computer peripheral devices as well as Part 15 modular transmitters. In both cases, the Commission was faced with devices intended to be used in conjunction with a variety of other devices. In both cases, requiring separate authorizations for every combination of devices would have created a significant administrative backlog and resulted in marketing delays. Further, the Commission had assured itself, based on its experience in those cases that adopting a modular approval policy would pose little risk of harmful interference. Both policies have been successful.

For similar reasons, the Commission can permit the authorization of the linear amplifiers used in cellular and PCS base stations through a modular approval policy. Experience has shown little threat of harmful interference from the various combinations of devices and the exploding marketplace is putting great pressure on manufacturers to respond quickly to the needs of licensees who are expanding and upgrading their networks.

For instance, many of the components and subsystems which comprise a cellular base station or LPA assembly are “passive” devices that do not require separate compliance testing or approval. Active components or subsystems, such as preamps, converters and modulators, may require compliance testing and/or Commission approval, depending on whether they are marketed as stand alone external components or internal devices. But passive and active devices are becoming interchangeable in modular base station and LPA system designs. Borrowing from the computer industry’s regulatory experience, passive and active devices in modular base station and LPA equipment that interconnect externally can be tested for compliance once and can then be configured with other Commission-compliant devices without the need for retesting or re-authorization.

Essentially, just as computing equipment is tested with a representative collection of devices (certified computer, printer, mouse, and other external peripherals), Powerwave would test an external linear amplifier (or a certified internal amplifier with a standard interface) with a representative combination of equipment – a certified transmitter, a preamplifier, a rack, Diplexer and Attenuator. Assuming the amplifier complied with Commission standards, it could then be marketed with any combination of such devices. Similarly, in cases where identical amplifiers, “ganged” together, comply with the Commission’s standards, the single amplifier should be considered certified as well under the same FCC Identifier. Under the informal modular approval policy, the Commission has followed these procedures and the system has worked well. As long as the amplifier’s power were not increased beyond the power it was tested to, or it was used with a different form of modulation, the amplifier would be considered certified for use with any certified base station transmitter and associated equipment.

### **Miscellaneous Issues**

In addition to adopting a modular authorization policy, Powerwave also recommends that the Commission take this opportunity to clarify the measurement procedures which, like its authorization policy have been developed by the staff to meet changing technological demands, but which have not been formally established. Some of the procedures are:

Output Power. Historically, the Commission has found that when an LPA was reduced in power, its linearity often changed, creating spurious emissions (particularly at lower frequencies. Accordingly, for user-adjustable LPA’s adjusted below 85% of their rated power, the Commission has placed restrictive note codes on authorizations. This practice seems no longer necessary. With solid state technology, a reduction in power rarely results in unwanted emissions.

Intermodulation testing. The Commission will allow IM measurements to be made using either a three signal or two signal test. A three signal test is preferred but two signal testing is allowed where a testing laboratory states it does not have the necessary

equipment to perform the three signal test. If the Commission intends to continue this policy, it would be useful to specify the policy in the Commission's rules or in a written test procedure.

Comparison of occupied bandwidth. At present, the Commission requires testing to compare the occupied bandwidth at the input and output of the amplifier in order to determine signal deterioration. As with most other required tests for linear amplifiers, the Commission's rules do not specify a test procedure.

Testing at maximum rated level. With no written guidance, the present procedure appears to be that the maximum rated level is whatever the manufacturer claims it to be. This may well be a reasonable marketplace approach to treating a maximum power level, since it is in the manufacturer's interest to choose a level within the capabilities of the device. Nevertheless, it would be useful to establish formal Commission direction on this matter.

**Adoption of a Modular Authorization Policy will Serve the Public Interest.**

Powerwave believes that a formal adoption of the LPA modular authorization policies already followed by the Commission's staff can only lead to much needed certainty in the marketplace and urges the Commission to proceed with rulemaking toward that end. Based on the experience already developed, the Commission can be assured that a modular authorization policy will present no increased threat of harmful interference. At the same time, manufacturers of linear amplifiers will be better able to efficiently meet the growing needs of cellular and PCS licensees who are dynamically installing and improving their systems. Personal communications growth appears exponential and a third generation of devices are on their way. If unnecessary equipment authorizations requirements can be eliminated and a more certain modular approval process formally adopted, the public interest will be served.

For the reasons stated above, Powerwave recommends that the Commission proceed with a rulemaking proceeding to codify a modular approval policy for linear

amplifiers. Powerwave stands ready to provide the Commission with whatever additional information it may require.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Terry G. Mahn', with a long horizontal flourish extending to the right.

Terry G. Mahn  
Robert J. Ungar  
Counsel for Powerwave  
Technologies, Inc.